

AD-A094 479

HOUSTON UNIV TEX

F/G 5/9

EVALUATION OF A NEW METHOD FOR ASSESSING CHANGE TO PLANNED JOB --ETC(U)

DEC 80 J R TERBORGE, G A DAVIS

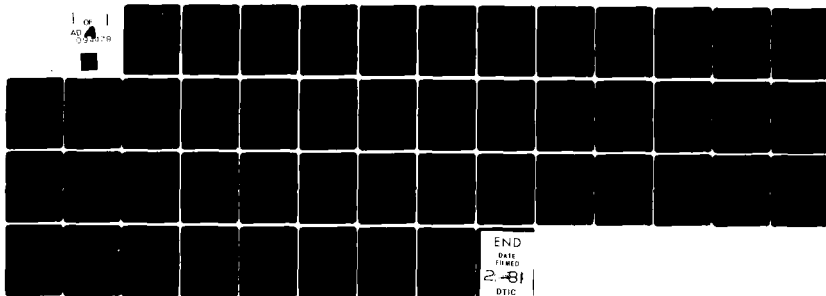
N00014-78-C-0756

UNCLASSIFIED

TR-80-6

NL

1 of 1
AD-A094 479



END

DATE

FORMED

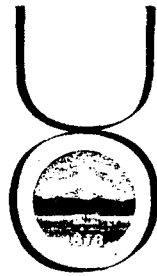
2-81

DTIC

AD A094479

LEVEL II

12



DEC FILE COPY

Graduate School of Management
University of Oregon
Eugene, Oregon 97403

DISTRIBUTION STATEMENT A	
Av	Unlimited

81 2 - 03 010

12

Approved for public release; distribution unlimited.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER 7R-80-6-1	2. GOVT ACCESSION NO. AD-A094479	3. RECIPIENT'S CATALOG NUMBER (9) Technical report	
4. TITLE (and Subtitle) Evaluation of a New Method for Assessing Change to Planned Job Redesign as applied to Hackman and Oldham's Job Characteristic Model.		5. TYPE OF REPORT & PERIOD COVERED	
7. AUTHOR(s) James R./Terborg and Gregory A./Davis		6. PERFORMING ORG. REPORT NUMBER (15)	
5. PERFORMING ORGANIZATION NAME AND ADDRESS Department of Management College of Business Administration University of Oregon, Eugene OR 97403		8. CONTRACT OR GRANT NUMBER(s) NON 00014-78-C-0756	
11. CONTROLLING OFFICE NAME AND ADDRESS Organizational Effectiveness Research Programs Office of Naval Research Arlington, VA 22217		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR 170-877	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) (12) 48		12. REPORT DATE December 1980	
		13. NUMBER OF PAGES 38	
		15. SECURITY CLASS. (of this report) UNCLASSIFIED	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Job redesign	Employee Perceptions
Change	Intra-rater Agreement
Response Shift	Retrospective Ratings
Frame of Reference	
Priming	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Pre and Post ratings of job characteristics collected in studies of planned job redesign may provide inaccurate assessment of perceived change if the intervention alters the frame of reference used by the incumbent to anchor responses. Based on Howard's work with response shifts (Howard et al, 1979), an experimental simulation was conducted that included Pre, Post and Retrospective Then ratings. Forty eight subjects worked at enriched and unenriched versions of a work-study job. Although a response shift was not found, retrospective ratings were found to be internally valid and using a within subjects design, support for the Hackman-Oldham model was observed. Future use of retrospective ratings is discouraged.

DD FORM 1473
1 JAN 73EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-60011

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

171500

Evaluation of a New Method for Assessing Change to Planned Job Redesign
as Applied to Hackman and Oldham's Job Characteristic Model

Implicit in the job design literature is the notion that properly planned changes in job activities will result in improved employee attitudes and behaviors (cf, Herzberg, 1966; Scott, 1966; Emory and Trist, 1969; Hackman and Oldham, 1976; Keller, Szilagyi and Holland, 1976). The empirical literature, however, only infrequently includes reports of employee reactions to job characteristics both before and after job redesign has taken place. Furthermore, when such research designs are used the issue of how to unambiguously measure change can become a problem.

The goal of this research is to consider the utility of a new approach to the measurement of change as applied to the Hackman and Oldham model (1976). This approach draws heavily from the work of Howard (Howard, Ralph, Gulanick, Maxwell, Nance and Gerber, 1979; Howard and Dailey, 1979; Howard, Schmeck and Bray, 1979) on response shift bias. The potential contribution of this research lies in the ability of response shift methodology to provide a more valid test of employee reactions to job redesign.

Critical Aspects of the Hackman and Oldham Model of Job Design

The job characteristics model proposed by Hackman and Oldham focuses on five core job dimensions that are hypothesized to be related to key psychological states and to various personal and work outcomes. These dimensions are: skill variety, task identity, task significance, autonomy and feedback. The Job Diagnostic Survey (JDS) was developed to measure each of these core dimensions (Hackman and Oldham, 1975). Using the JDS, it is possible to compute a summary score indicating the overall motivating potential score,

or MPS, of a job. Individuals who describe their jobs with high MPS scores are predicted to display high internal motivation, high quality of work, low absenteeism, and low turnover, and to report high job satisfaction.

Within the confines of the model, it is important to recognize two critical and seemingly obvious aspects that are rarely considered jointly when the model is tested. The first aspect is the dynamic nature of the model. It is based on the idea of change. One of the main reasons that Hackman and Oldham developed the model was to have it serve as a framework for changing jobs (Roberts and Glick, in press). Embedded in this notion of change is the second critical aspect. Incumbent perceptions of the job are the appropriate criteria for determining whether or not the job has changed. Although Hackman and Oldham (1975) originally recommend that JDS ratings be supplemented by independent assessments made by individuals who are not incumbents of the focal job, they also admit that "when the intent is to predict or understand employee attitudes or behavior at work, employee ratings of the job dimension should be used since it is the employees' own perception of the objective job that is causal of his reactions to it" (Hackman and Oldham, 1975, p. 169).

In summary, the job characteristics model proposed by Hackman and Oldham is a within-subjects model that is concerned with an individual's perceptions and reactions to a situation and how these perceptions impact on attitudes and behavior. Changes in the nature of the job are thought to produce different perceptions of the job and this leads to changes in attitudes and behaviors. The critical link in this causal model seems to be perceptions of differences in the job by the incumbent stemming from objective changes due to an intervention. The greater the perceived change an individual "sees" the greater the change in that individual's attitudes and behaviors.

Review of Literature

Examination of past research reveals that the various designs most often used to test the Hackman and Oldham model usually ignore one or the other of the two aspects of the theory just discussed, and consequently these designs provide differential support.

One of the more frequent designs used is correlational in nature. The JDS is administered to a group of employees and either core dimension scores or MPS scores are correlated with outcomes such as performance, absenteeism, turnover, satisfaction, and internal work motivation. The job is not changed and incumbents' perceptions of the job and reactions to the job are measured at one point in time.

Several studies were found that used this correlational design (cf. Brief and Aldag, 1975; Evans, Kiggundu and House, 1979; Hackman and Oldham, 1975, 1976; Keller, Szilagyi and Holland, 1976; and Stone and Porter, 1975). Taken as a whole these correlational studies provide positive albeit limited support for the model.

The inadequacy of the correlational design to test the Hackman and Oldham model logically leads to the use of experimental and quasi-experimental designs. In this approach, the job is changed, either by a planned intervention or due to some naturally occurring event. Typically, these studies employ what Campbell and Stanley (1963) would call a nonequivalent control group design in which Pre-test and Post-test are used to collect self-report measures of the five core dimensions and employee attitudes for both the treatment group and control group.

A review of the literature produced four experimental tests of the Hackman and Oldham model (cf. Frank and Hackman, 1975; Hackman, Oldham, Janson and Purdy, 1975; Hackman, Pearce and Wolfe, 1978; and Umstot, Bell and Mitchell,

1976). The overall findings were inconsistent and generally less supportive than the correlational studies.

One explanation for different results produced by correlational methods and experimental methods might be that in the experimental studies the job did not markedly change. This would produce the pattern of more negative results. But, this explanation seems to apply primarily to Frank and Hackman (1975).

A second explanation stems from the use of incumbents' perceptions to measure not only the degree to which the objective job characteristics had changed, but also their affective reactions to the job changes. The experimental studies implicitly test the notion that changes in job characteristics change incumbent perceptions of the job which in turn change attitudes and behaviors on the job. These studies, however, assume that changes in job characteristics are the primary thing that affect perceptions of the job. But, Salancik and Pfeffer (1977) have argued that social cues might also influence job perceptions. White and Mitchell (1979) and O'Reilly and Caldwell (1979) have empirically demonstrated this possibility. Priming is another factor mentioned by Salancik and Pfeffer (1977). Priming refers to the possibility that obtrusive data collection might make various aspects of the situation more salient than they might be otherwise. If this happens, it should produce artificially inflated correlations between job characteristics and attitudes, which it may well do in the correlational studies. Using Salancik and Pfeffer's (1977) logic, however, priming should have the same effect on the experimental studies, which it does not always do (see Frank and Hackman, 1975; Hackman, Pearce and Wolfe, 1978; and O'Reilly and Caldwell, 1979 as examples), and thus does not explain the difference between the results produced by the two methods.

A third factor that may affect perceptions of the job is the frame of reference of the perceiver. Past experiences, perceptions of available alternatives and expectations provide anchors that are used to scale a given phenomenon (Smith, Kendall and Hulin, 1969). This suggests that differences in perception by employees on the same job may be due in part to different frames of reference. The Job Characteristics Model, however, is a within-subjects model so in one sense inter-rater agreement is not important. But, something that would be important for tests of a within-subjects model is intra-rater agreement. An employee's Pre-ratings may be based on one set of anchor points which in turn are based on the employee's past experience with the job and other jobs. Post-ratings of the job characteristics after job redesign, however, may be based on a different set of anchors because receiving treatment, i.e., job enrichment, changes the employee's evaluation standard with regard to the dimension being measured. For example, an employee might believe that a substantial amount of autonomy exists in the job and as a result, this dimension is given a score of seven on the JDS scale at Pre-test. But, after the job has been enriched, the same employee realizes the full range in amount of autonomy a job can have and rates the new job (which actually allows more freedom in scheduling and doing the work) as a six on the JDS autonomy scale. Furthermore, the employee may tell you that the enriched job has more autonomy and that the Pre-test score was inaccurate.

Response Shift Bias

A change in the frame of reference of the perceiver resulting from planned intervention is what Howard calls a "response shift." A response shift is similar to Beta change (cf. Golembiewski, Billingsley and Yeager, 1976; Terborg, Howard and Maxwell, 1980).

In a series of 12 studies Howard and his colleagues (Howard, Ralph, Gulanick, Maxwell, Nance and Gerber, 1979; Howard and Daily, 1979; Howard, Schmeck and Bray, 1979; Howard, Daily and Gulanick, in press; Howard, Millham, Slaten and O'Donnell, in press; and Bray and Howard, in press) demonstrated that self report ratings at Pre-test may be based on a different frame of reference than self-report ratings at Post-test. Thus, comparison of Pre and Post intervention scores may not accurately reflect perceived change as conceptualized by the person at Post-test.

To assure that before and after ratings are made on the same subjective scale, Howard et al (1979) recommend that at Post-test, each person be asked to make two ratings. The first rating is the usual Post-test description of the phenomenon under investigation after the planned intervention. The second rating, however, asks the person to describe the phenomenon as it is now perceived to have been just before the intervention. This retrospective rating is called the "Then" measure by Howard. If Pre-ratings and Then ratings are different, a response shift is said to have occurred. This suggests that perceived change resulting from the intervention should not be assessed as Post-Pre scores. Rather, Howard et al (1979) recommend that Post-Then scores be used. It should be noted that Howard et al (1979) do not predict the occurrence of response shifts to all planned interventions. Rather, they offer a method for detecting response shifts and for measuring change when response shifts are found.

The implication of a response shift for tests of the Job Characteristics Model is straightforward. Returning to the earlier example, a person may rate autonomy as a seven at Pre-test, a six at Post-test, and a three using the Then rating. Past experimental tests of job redesign models have neglected to consider the possibility of a response shift. Consequently, our hypothetical Pre

and Post scores would indicate that the person perceived a slight decrease in autonomy whereas the Post and Then scores would indicate a substantial perceived increase. Existence of a response shift could explain the negative results found by Frank and Hackman (1975), the failure of several core dimensions to show change after enrichment in the Umstot et al study (1976), and the weak effects found for job characteristics reported by O'Reilly and Caldwell (1979) and White and Mitchell (1979). Response shift effects also could contribute to the observation of more positive results found with correlational studies as compared with experimental studies. Because in correlational designs all the data are collected at the same time, changes in frames of reference are unlikely.

Before we totally endorse the response shift methodology, the technique must demonstrate validity. Howard has investigated this question. Howard, Schneck and Bray (1979) and Howard and Daily (1979) found that different conclusions about the effectiveness of an intervention could be made depending on whether Post-Pre scores or Post-Then scores were used. Howard et al (1979), Howard and Daily (1979), and Howard, Schneck and Bray (1979) found that Post-Then scores as compared with Post-Pre scores were more highly correlated with independent and objective assessments of change, and consequently were more valid. Several other studies also demonstrated that Pre-Then differences were not the result of memory biases (Howard et al, 1979) or social desirability (Howard, Millham, Slaten and O'Donnell, in press).

The Research Problem

The present research is an experimental study of the Hackman and Oldham model that will attempt to extend the research on response shift bias to the evaluation of job redesign programs in order to ascertain if the existing experimen-

tal and longitudinal studies of job enrichment might be compromised by response shifts. Two major research questions are addressed:

- 1) Can the response shift be shown to exist in ratings of job characteristics?
- 2) If so, does the retrospective rating provide a more valid predictor of individual change?

In order to answer these questions, however, other conditions must be satisfied. When considering the utility of a new approach to the measurement of change, it is important that the new approach be methodologically sound. The use of Then ratings should not result in methodological artifacts. Also, some support for the Hackman and Oldham model should be found. The validity of retrospective Then ratings cannot be demonstrated if the Job Characteristics Model is incorrect or the manipulations did not work.

In order to check on these methodological concerns, the present study was designed to investigate the following methodological questions in addition to the main research questions:

- 1) Are different experimental groups working on the same task equivalent at Pre-test?
- 2) Does administration of a Pre-test measure affect either the Post-test or Then measure?
- 3) Does administration of a Post-test measure affect the Then rating?
- 4) Does administration of the Then measure affect the Post-test measure?
- 5) Does knowledge of Post-test responses affect the Then responses and vice versa? In other words, is there an order effect when presenting the Post and Then measures?
- 6) Did the manipulations have an effect using the conventional Pre and Post measures?

METHOD

Overview

Subjects worked a total of five hours in two sessions on a job that they thought was for a proposed student-work program. A similar situation was used by O'Reilly and Caldwell (1979). The task consisted of doing various activities associated with coding and evaluating videotaped personnel selection interviews. Two interview evaluation tasks, one enriched and one unenriched, were designed. In order to answer the proposed methodological and research questions, five groups of subjects were formed. Although subjects viewed the videotapes in small groups, they worked independently.

Subjects and Assignment to Treatment Groups

Fifty-one advanced undergraduate students recruited from courses in industrial psychology served as subjects. One subject was dropped from analysis because a fire destroyed her apartment and she was unable to attend the second session of the experiment. Two additional subjects were dropped because a flood prevented them from attending the second work session. No subjects were dropped because of hurricanes or locust. All subjects had received prior training on personnel interviewing in their psychology classes. Average age was 27.5 years and 44% of the subjects were male.

Students were contacted in class and asked to help in evaluating data collected by the Interviewing Institute at the University of Houston. Extra credit was offered as an incentive. Students were told that various activities were being considered for a student work-study job and that their exposure to interviewing would be helpful in evaluating the feasibility of creating the position. Subjects were not randomly assigned to treatment groups, rather,

each treatment group consisted of the subjects who volunteered from a particular class. But, assignment of a particular treatment condition to a group was random. Intact groups were used for two reasons: 1) it was feared that mixing subjects across classes would increase the threats of diffusion or imitation of the experimental treatment and hypothesis guessing within experimental conditions (Cook and Campbell, 1976) and 2) because an advanced understanding of interviewing skills was required, subjects with the necessary qualifications were impossible to find in large numbers at a given point in time. Altogether, data collection was underway during summer and winter sessions of 1979 and spring session of 1980.

Description of Tasks

The basic job involved rating and coding information from videotaped selection interviews that were conducted at the Interviewing Institute at the University of Houston. The particular videotapes used for this research came from a larger set used by Howard and Daily (1979). Care was taken in selection of videotapes to assure that interviews were of equal length (28-30 minutes), similar interest value, similar audio and visual quality and not embarrassing to participants. All subjects were shown the same videotapes, but different videotapes were used across the two work sessions. Subjects were aware that applicants were applying for the job of assistant manager in a quick service grocery store chain.

To create an enriched and an unenriched task, the five core job dimensions were manipulated as follows:

Autonomy. The enriched task provided the subjects with complete control over any decision made in the evaluation of the applicant and the interviewer. In the unenriched task, subjects were provided stop watches and directed to time

and record how long the interviewer talked.

Skill Variety. The enriched task required the subject to evaluate two taped job interviews and make judgments on several dimensions regarding both the applicant and the interviewer. For example, subjects had to evaluate the degree the interviewer actively listened to the applicant and whether or not the interviewer obtained relevant material regarding the applicant's qualifications. The unenriched task required very little skill beyond being able to run a stopwatch and record time.

Task Identity. The enriched task entailed a complete evaluation of each interview. The unenriched task involved only a minor part of the interview and it was stressed that at a later date a more complete evaluation of the same interviews would be done by other raters.

Feedback. After each tape was run in the enriched task and subjects had rated both the interviewer and the applicant, discussion was held among the subjects on how they rated the applicant and interviewer. In this way, subjects received some feedback as to how they were doing relative to their co-workers. In the unenriched task no feedback was given concerning the correct time that an interviewer talked during a given tape nor were subjects allowed to discuss the amount of time they had recorded for a given interviewer.

Task Significance. The enriched task was presented as part of a validity study being conducted by the Interviewing Institute. Subjects doing the enriched task were provided with a number of reasons why such a study is important and the different people that could be affected by outcomes of the study. Also, they were told that their participation in the study might help develop a new work-study job at the University of Houston. The unenriched task was presented as a "necessary evil—something that needed to be done to store in the Institute's data files."

In order to insure that these manipulations had the desired effect, a pilot study was conducted ($N = 12$) in which the group worked first on the unenriched task and then on the enriched task. Using dependent t -tests on comparisons for the five job characteristics as measured by the JDS at Pre and Post, differences between means for all dimensions except task significance, were significant; $p < .01$, and in the expected direction. The manipulation was considered successful.

Dependent Measures

The short form of the JDS was used to measure perceptions of the task, internal work motivation (IWM), growth need strength (GNS) and general job satisfaction (GS) (Hackman and Oldham, 1975). Retrospective Then ratings were obtained for perceptions of the core job dimensions following recommendations by Howard et al (1979). At Post-test, subjects responded to each item twice. They first rated the second session task on a particular item and then were asked to rate the first session task on the same item as they now perceived it to have been prior to the job change.

Although it was possible to collect measures of work performance quality on both enriched and unenriched tasks, due to the nature of the job redesign, it was not meaningful to compare differences in quality across the two tasks as a function of differences in MPS scores. But, it would be reasonable to assume that changes in MPS scores from unenriched to enriched tasks might predict quality of performance on the enriched task. People who perceive substantial improvements as a result of job redesign should be most highly motivated to do high quality work on the enriched task. This proposed analysis, however, becomes a between subjects test of the model and is less appropriate than a within subjects test.

Specifically, quality performance on the enriched task was operationalized in a manner similar to the use of the distribution mean as an index of the true score in classical psychometric theory (cf, Lord & Novick, 1968). Each subject provided an overall rating of the effectiveness of the interviewer for each of two videotapes used in the enriched condition. The mean rating for each interviewer across subjects was computed. These values were considered the best estimates of the "true" ratings. This "true" rating for each interviewer was subtracted from each individual rating. The absolute values of these scores were computed and the two scores were averaged. The result was interpreted as an index of error for each subject. The larger the individual deviation from the "true" rating, the lower the quality of performance.

Design and Analysis

In order to investigate questions raised in the introduction, five treatment conditions were used. These conditions are diagramed in Table 1.

=====
Insert Table 1 About Here
=====

The first four conditions presented the unenriched task first and the enriched task second. The fifth condition was one of the many controls and consisted of two unenriched task sessions. Conditions three and four deserve special mention. To address the methodological question of whether or not asking for Then scores affects Post ratings, subjects in condition three completed the Post questionnaire and essentially believed that the task was over. They then were presented with a second brief questionnaire and asked to provide the Then ratings. Similarly, to address the methodological question of whether Then ratings affect Post ratings, subjects in condition four completed the Then questionnaire and once this was handed to the experimenter,

the Post questionnaire was administered. This procedure provided maximum data collection from a limited number of available subjects. For all other subjects, Post and Then ratings were collected simultaneously on the same questionnaire in accordance with procedures recommended by Howard et al (1979).

Procedure

When subjects arrived at the workrooms they were read a brief description of the type of task on which they were going to work and a statement of the purpose of the study. They then provided biographical information and responded to the growth need strength section of the JDS. Upon completion the experimenter told them about the unenriched task and explained how to record the amount of time an interviewer talked during an interview. A brief practice period was conducted to assure operation of the stop watches. Subjects then viewed and timed three consecutive videotapes. After the last tape, subjects completed the Pre-questionnaire and were reminded to return for the second session. Subjects spent a total of two and one-half hours in this session.

The second session consisted of doing the enriched task and this was held within 10 days of the first session. Subjects were told that all the tapes that had to be timed were finished and that now their help was needed in determining the validity of the Interviewing Institute. The enriched task was described and the importance of doing the task was emphasized. Subjects then watched and evaluated two videotaped interviews. After the last tape, subjects completed the Post and Then questionnaires. Subjects spent a total of two and one-half hours in this session. In the control condition subjects worked on the unenriched job for both sessions.

At conclusion of the second session, subjects were thoroughly debriefed and asked not to discuss the true nature of the project with students in other

classes who might be in different treatment conditions.

RESULTS

Methodological Question No. 1: Are the different experimental groups equivalent at Pre-Test?

A one-way MANOVA using Pre-test scores on five dependent variables yielded no statistically significant differences among the groups, Multivariate $F(15, 88.73) = .718$, $p = .76$. The means, standard deviations and univariate F tests for each variable are presented in Table 2. These findings

=====
Insert Table 2 About Here
=====

suggest that even without random assignment of subjects to conditions, the groups are very similar with respect to these five important variables. An inspection of standard deviations reveals, however, that at least with regard to MPS scores there is considerable disagreement as to how the task is perceived within each group. These high standard deviations underscore the importance of testing the Hackman and Oldham model using a within-subjects design as done in this study. It is also important to note that the mean MPS scores across all four groups are extremely low, the highest being 56.54. The lowest MPS score reported by Hackman and Oldham (1975) was 115 for the Maintenance-Service category. The low MPS found in this study could be interpreted as proof that the timing task was indeed perceived as being unenriched. Another explanation for these results, however, might be that the subjects were not very involved in the study and consequently put little effort into rating the job characteristics.

Methodological Question No. 2: Does administering a Pre-test measure affect either the Post or Then measure?

A t-test (using separate variance estimates) was used to compare the means of Group 1 and Group 2 on the MPS variable for both Post and Then measures. Differences between the means for both measures were non-significant: Post measure of MPS, $t(17.9) = 1.06$, $p = .30$; Then measure of MPS, $t(14.9) = 1.56$, $p = .14$. The means for Group 1 and Group 2 were respectively, 104.19 and 75.81 for the Post measure and 31.57 and 12.66 for the Then measure. The standard deviations for Groups 1 and 2 were 70.92 and 48.57 (Post measure) and 39.22 and 12.46 (Then measure). The effect of administering a Pre-test might be expected to increase the Post-test scores either through practice effects (Campbell and Stanley, 1963) or through priming (Salancik and Pfeffer, 1977). Although Post-test and Then measures were higher in Group 1, there were no statistically significant differences between the two groups. These data provide some evidence that the use of the Pre-test does not automatically influence either the Post or Then ratings of MPS.

Methodological Question No. 3: Does administering a Post-test affect the Then rating?

When making a Post rating at the same time as the Then rating the Post rating may act as a "primer" by drawing attention to the contrast between the unenriched and enriched tasks. If this were the case, Then scores should be noticeably lower in the group where the Post-test was administered simultaneously with Then ratings. A t-test was used to compare the means of Group 1 and Group 4 on the Then MPS rating. The difference between the means was non-significant: $t(15.11) = .82$, $p = .42$. Means for Groups 1 and 4 respec-

tively were 31.66 and 21.39 and standard deviations were 39.22 and 15.39. Although the mean was higher when Post scores were collected, it appears that giving a Post-test measure at the same time as a Then measure has little effect on the Then MPS measure.

Methodological Question No. 4: Does administering the Then measure affect the Post-test measure of MPS?

It is possible that filling out the Then measure at the same time as the Post measure may artificially inflate the Post measure either due to unforeseen demand characteristics present during the experiment or to hypothesis guessing. If this were the case, the group without the Then measure should have significantly lower Post MPS scores than the group in which the Then measure was administered along with the Post measure. In order to test this question a t-test was used to compare Groups 1 and 3 on the Post-test measure of MPS. There was no significant difference between the two means: $t(18.99) = .70$, $p = .49$. The means for Group 1 and Group 3 were 104.19 and 85.4 respectively. The standard deviations for the two groups were 70.92 and 51.52.

The combined results of these questions point to two conclusions. The administration of any one of the types of measures (Pre, Post or Then) seems to have little impact on the other measures, and there seems to be a considerable range of MPS scores among subjects as to the nature of a particular task.

Methodological Question No. 5: Does knowledge of Post-test responses affect Then responses and vice versa?

Another methodological concern raised by using a retrospective Then measure was whether order of presentation of the Post and Then measures would

have any effect. It is possible that responding to the Then question might draw attention to how "bad" or unenriched the first task was, and this could produce an artificially high Post score. On the other hand, it is conceivable that answering the Post measure on the enriched task might cue the subjects to provide an especially negative rating for the unenriched task. To test these questions, Groups 3 and 4 were compared on both the Post and Then MPS responses using separate t-tests (pooled variance estimate). Results were as follows: Post measure of MPS, $t(16) = .91$, $p = .39$; Then measure of MPS, $t(26) = 1.96$, $p = .07$. Means and standard deviations for the Post measures were as follows: Group 3 $\bar{X} = 85.40$, $s.d. = 51.52$; Group 4 $\bar{X} = 119.06$, $s.d. = 98.87$. Means and standard deviations for the Then measures were as follows: Group 3 $\bar{X} = 10.22$, $s.d. = 7.5$; Group 4 $\bar{X} = 21.39$, $s.d. = 15.39$. Inspection of these statistics suggests that responding to the Then measure before filling out the Post measure seems to have little effect on the Post measure, but that responding to the Post measure before filling out the Then measure may influence the Then measure by lowering the rating. This interpretation is proposed with two reservations. The comparison between the two means for the Then measure was only marginally significant ($p = .07$). And, 15 statistical tests were done in this section on methodological questions without controlling the alpha level across the family of tests. It is possible that the marginally significant result in this one comparison was a function of the large number of tests performed on the data. But, we also should note that the tests probably had low power given the sample size.

Methodological Question No. 6: Did the manipulation have an effect using the conventional Pre/Post measures?

Because the groups were not significantly different at Pre-test and the

various testing procedures did not seem to produce effects confounded with the treatment effects, Groups 1, 3, and 4 were combined and tested against Group 5 on three Post-Pre change score variables.

An a priori Hotelling T^2 multivariate comparison was conducted to investigate differences between the two groups on changes in internal work motivation (IWM), general satisfaction (GS) and motivating potential (MPS). Results yielded a ^{marginally} significant overall difference between the groups: Multivariate $F(3.34) = 3.44$, $p = .08$. The means, standard deviations and univariate F tests for each variable are presented in Table 3. Inspection of the means

=====
Insert Table 3 About Here
=====

and univariate F tests indicates that the change from the unenriched job to the enriched job was successful in increasing the motivating potential score, internal work motivation rating, and general satisfaction rating of the experimental subjects (Groups 1, 3, and 4) relative to the control group subjects (Group 5). These data provide evidence that the manipulation had the desired effect and that the Post-Pre method of measurement was able to detect that effect. These results support the Hackman and Oldham (1976) model, which states that increases in MPS should lead to increases in both work motivation and general satisfaction.

Research Question No. 1: Can the response shift be shown to exist in ratings of job characteristics?

A dependent t -test was performed on the Pre and Then measures of MPS for Groups 1, 3, and 4. The means for Pre and Then respectively, were 31.53 and 22.11 and the standard deviations were 53.20 and 27.30. The difference between the means, although in the predicted direction, was not statistically

significant: $t(29) = .90, p = .37$. Consequently, a response shift was not present in the rating of job characteristics with these data.

Research Question No. 2: Does the retrospective Then rating provide a more valid predictor of individual change?

In order to answer this question, the relative predictive abilities of five variables (change in MPS score from Pre to Post, change in MPS from Then to Post, growth need strength and the interaction of the two MPS measures and GNS) were investigated in a number of hierarchical regression equations using the dependent variables of Post-Pre change in general satisfaction, Post-Pre change in internal work motivation, and Post performance. In the analysis of the first three dependent variables all groups were included except Group 2 because no Pre-test was given to that group. In the analysis of the Post performance measure only groups that worked on the enriched task and had Pre, Post and Then measures were included in the analysis (Groups 1, 3, and 4). Results of these analyses are presented in Tables 4, 5, and 6. They

=====
Insert Tables 4, 5, and 6 About Here
=====

suggest that regardless of position in the regression equation or the particular dependent variable examined, the change in MPS scores (both Post-Pre and Post-Then versions) accounts for the most variance in the change in dependent variables. For general satisfaction and internal work motivation the MPS change scores are the only independent variables that account for a significant proportion of the variance. These results support the contention that changes in satisfaction and internal work motivation should be predictable from changes in MPS scores (Hackman and Oldham, 1976), but, these results do not support the use of GNS as a moderator of individual reactions to job en-

richment or the hypothesis that job enrichment and quality of job performance are positively related (Hackman and Oldham, 1976). The regression results do indicate that both types of MPS change scores (Post-Pre and Post-Then) can predict changes in satisfaction and work motivation. A t-test for comparing differences between dependent correlation coefficients (McNamar, 1969, p. 158) was used to test for significant predictive differences between the two methods. There were no significant differences between the Post-Pre method and the Post-Then method on any of the dependent variables. It seems that both methods were equally valid in predicting individual change in satisfaction and motivation. This finding is not unreasonable given the lack of evidence for a response shift.

DISCUSSION

Howard's work on the use of retrospective Then scores in evaluating subject reactions to planned interventions (Howard et al, 1979) was investigated as having potential to provide more accurate tests of job redesign changes. The Job Characteristics Model (Hackman and Oldham, 1976) was chosen for study as it currently is the dominant paradigm in the task design area (Evans, Kiggundu and House, 1979). In addition, some field experiments of this model have produced unexpected results that could be explained through use of the response shift concept. We believed a contribution would be made to the job design literature if we could demonstrate the validity of retrospective Then measures and their utility in assessing change.

Results of a controlled experimental simulation supported the validity of the retrospective Then measurement technique. Retrospective ratings were not related to measurement bias and Post-Then scores accurately predicted change in attitudes.

Turning first to the six methodological questions, the obtained results suggest that the retrospective Then methodology is not highly susceptible to problems associated with order effects, saliency or priming. Asking for Pre ratings and/or Post ratings of job characteristics did not significantly impact on Then ratings in this study. Similarly, asking for Then ratings did not impact on Post ratings. Pre ratings also had no impact on Post ratings as typically assessed in past experimental studies of job change.

These results are important, especially as they were produced in an experimental simulation where demand characteristics might be strong. Most recently, Salancik and Pfeffer, (1977) and Koch and Rhodes (1979) raised concerns over use of obtrusive survey data collection methods in tests of planned change. Pre-test data collection may encourage subjects to bring attitudes and perceptions into conformity with one another. Specific aspects of the job are made salient as a result of Pre-test measurement and this may impact on selective perceptions, perceptual distortion, and perceptual consistency. Pre-test measurement also may prime or educate subjects regarding appropriate or desired responses. Saliency and priming represent factors that could effect Post or Then ratings of job characteristics independent of any actual changes made in the nature of the job.

The present study offers one point arguing against the automatic biasing effect of these threats to internal validity. This, of course, does not imply that saliency, priming and order effects are pseudo problems. But, in the absence of properly designed research dealing with this question the non-equivalent control group design is the most common design of field research on change (Porras and Berg, 1978) — our results would seem to make a contribution. These data, in combination with Howard's finding that retro-

spective Then ratings were not biased by memory distortion or social desirability, offer encouraging support for future use of retrospective ratings following change.

Results pertaining to the two research questions are somewhat more difficult to evaluate. Using a within subjects design that related individual change in MPS scores to individual change in internal work motivation and general satisfaction, strong support was found for Hackman and Oldham's (1976) hypothesized change in dependent variables. This occurred regardless of whether perceptions of change were assessed with Post-Pre scores or Post-Then scores. There was no support for the hypothesized change in quality of performance or for the moderating effect of growth need strength. This pattern of results is consistent with Umstot et al (1976). The lack of relationship between changes in MPS scores and performance quality found in our study should be viewed with some reservation, however. The criterion measure was essentially a between subjects index whereas the predictor was a within subjects index. It was not possible to construct a meaningful within subjects measure of performance. Also, the construct validity of our error index is unknown.

Although the test of the Job Characteristics Model was essentially a method check for appropriate evaluation of retrospective Then ratings, our results do have implications for the job design literature. The study was set up as a within subjects test of the model. This design more closely resembles the dynamics of the hypothesized relationships. The importance of such designs was underscored by the relatively large standard deviations found in MPS scores. In contrast, previous tests of the Job Characteristics Model have either failed to manipulate the job or used between subjects designs. The present study also included a control group and checks on the impact of saliency and priming

on subjective ratings. We are not proposing that a controlled simulation lasting a total of five hours with college students as subjects be evaluated as a superior method for testing Hackman and Oldham's model. But, this method was appropriate for evaluating the retrospective Then approach to assessing change. And, in order to accomplish that goal we needed to demonstrate some support for the Job Characteristics Model. Post-Then scores were sensitive to changes in job characteristics and these scores did predict changes in general satisfaction and internal work motivation.

The utility of retrospective Then ratings as applied to tests of planned job redesign is still partially unresolved. The technique survived all hurdles except one. There was no evidence of a response shift. MPS Pre ratings were not significantly different from MPS Then ratings. Although Then ratings were lower as would be expected from Howard's research (Howard et al, 1979), there was no shift in anchor points or frames of reference. Lack of support for a response shift would occur for two reasons. The technique is not sensitive to detection of response shifts or, in this particular study, a response shift did not happen. We will address each of these issues.

The work by Howard and his colleagues on the response shift is extensive (cf. Terborg et al, 1980). Howard has addressed the notion of subject recalibration as a problem when Pre and Post designs are used. He has developed a method for detecting response shifts, i.e., when $Pre \neq Then$, and a method for assessing change when response shifts are found, i.e., $Post - Then$. He does not say that response shifts will always result from planned interventions. Because Howard has found considerable evidence for response shifts, our inability to detect a response shift in this one study would not imply that the technique is insensitive to subject recalibration. The accumulated evidence is very supportive of the use of retrospective ratings to assess perceptions of change.

But, we must point out one potentially important difference between this study and Howard's research. All of Howard's investigations have focused on a person's self rating of skill or level of functioning. The intervention was designed to change that person's skill or behavior. The object of the rating is the person. In our study, the object of the rating was the task. The notions of anchor points, frame of reference, and recalibration, however, would seem to be common to both types of ratings. Yet, it remains possible that this difference could produce insensitivity to detection of response shifts.

The second question is whether the nature of the task and our changes of that task were capable of producing conditions where a response shift might be produced. Pre scores should not be different from Then scores if the intervention had no impact on how subjects evaluated and rated concepts like autonomy and skill variety. Perhaps one precondition for response shifts is that the rater have limited knowledge of the full range the phenomenon can vary. A second precondition might be the magnitude of the change caused by the intervention. Even though our manipulation produced significant differences in Pre and Post MPS scores, the nature of the simulated job might have limited the efficacy of the intervention to yield a change in frame of reference.

Even though we were not able to produce a response shift, we strongly endorse the future use of retrospective ratings in studies of reactions to change. A response shift remains a viable rival hypothesis to the findings of Hackman, Pearce, and Wolfe (1978), and Frank and Hackman (1975). Inclusion of Then ratings to Pre and Post ratings, which perhaps adds at most 10% to the time needed to complete the survey instrument, would provide a valid test of whether a response shift had occurred and whether the Job Character-

istics Model was supported. The retrospective methodology also would be useful in studies examining the impact of more extensive changes as a result of Quality of Work Life projects and organization development. Retrospective ratings easily could be added to survey instruments commonly used in these types of studies.

A final comment about the use of retrospective Then ratings should be made. The retrospective rating technique is not a substitute for good research methods and it is not intended to replace the collection and use of Pre-test data. Pre-test ratings allow for comparison of group equivalency prior to interventions and examination of Pre and Then ratings allows for greater understanding of reactions to change (Terborg, Howard and Maxwell, 1980). Knowledge that a response shift had occurred provides additional evidence that the intervention had some effect.

In conclusion, use of retrospective Then ratings following a planned job change was found to be an internally valid method for assessing reactions to change. The ability to detect response shifts and to accurately measure change when response shifts occur would seem to be particularly useful in future work on job redesign because the Hackman and Oldham (1976) model emphasizes employee perceptions of change.

References

- Bray, J. H., & Howard, G. S. Methodological considerations in the evaluation of a teacher training program. Journal of Educational Psychology, in press.
- Brief, A. P. & Aldag, R. J. Employee Reactions to Job Characteristics: A constructive replication. Journal of Applied Psychology, 1975, 60, 182-186.
- Campbell, D. T. & Stanley, J. C. Experimental and quasi-experimental designs for research or teaching. In N. L. Gage (ed.). Handbook of research or teaching. Chicago: Rand McNally, 1963.
- Cook, T. D. & Campbell, D. T. The design and conduct of quasi-experiments in field setting. In M. Dunnette (ed.). Handbook of I/O Psychology. Chicago, Ill.: Rand McNally, 1976.
- Emory, F. E. & Trist, E. L. Socio-technical systems. In F. E. Emory (ed.). Systems thinking: London: Penguin, 1969.
- Evans, M. G., Kiggundu, M. N., & House, R. J. A Partial Test and Extension of the Job Characteristics Model of Motivation. Organizational Behavior and Human Performance, 1979, 24, 354-381.
- Frank, L. L. & Hackman, J. R. A failure of job enrichment: the case of the change that wasn't. Journal of Applied Behavior Science, 1975, 11, 413-436.
- Golembiewski, R. T., Billingsley, K., & Yeager, S. Measuring change and persistence in human affairs: Types of change generated by OD designs. Journal of Applied Behavioral Science, 1976, 12, 133-157.
- Hackman, J. R. & Lawler, E. E. Employee reactions to job characteristics. Journal of Applied Psychology Monograph, 1971, 55, 259-286.

- Hackman, J. R. & Oldham, G. R. Development of the job diagnostic survey. Journal of Applied Psychology, 1975, 60, 159-170.
- Hackman, J. R., Oldham, G., Janson, R., & Purdy, K. A new strategy for job enrichment. California Management Review, Summer 1975, 57-71.
- Hackman, J. R. & Oldham, G. R. Motivation through the design of work: test of a theory. Organizational Behavior and Human Performance, 1976, 16, 250-279.
- Hackman, J. R., Pearce, J. L. & Wolfe, J. C. Effects of Changes in Job Characteristics on Work Attitudes and Behaviors: A naturally occurring quasi-experiment. Organizational Behavior and Human Performance, 1978, 21, 289-304.
- Herzberg, F. Work and the nature of man. Cleveland: World, 1966.
- Howard, G. S., Ralph, K. M., Gulanick, N. A., Maxwell, S. E., Nance, D. W., & Gerber, S. R. Internal invalidity in pre-test post-test self-report evaluation and a reevaluation of retrospective pre-tests. Applied Psychological Measurement, 1979, 3, 7-23.
- Howard, G. S. & Dailey, P. R. Response shift bias: A source of contamination of self-report measures. Journal of Applied Psychology, 1979, 64, 144-150.
- Howard, G. S., Dailey, P. R., & Gulanick, N. A. The feasibility of informed pre-test in alleviating response shift bias. Applied Psychological Measurement, in press.
- Howard, G. S., Millham, J., Slaten, S., & O'Donnel, V. Response style bias: A problem in measuring pre/post change with self reports. Journal of Research in Personality, in press.
- Howard, G. S.; Schmeck, R. R.; & Bray, J. H. Internal invalidity in studies employing self-report instruments: a suggest remedy. Journal of Educational Measurement, 1979, 16, 129-135.

- Keller, R. R., Szilagyi, A. D., & Holland, W. E. Job Characteristics of Research and Development Personnel: Relationship with satisfaction and role variables. Academy of Management Review, 1976, 19, 7-12.
- Koch, J. L. & Rhodes, S. R. Problems with Reactive Instruments in Field Research. Journal of Behavioral Science, 1979, 15, 485-506.
- Linn, R. L & Linde, J. A. The determination of the significance of change between pre and post test periods. Review of Education Research, 1977, 47, 121-150.
- Lord, F. M. & Novick, M. R. Statistical theories of mental test scores. Reading, Mass.: Addison-Wesley, 1968.
- McNamar, Q. Psychological statistics. New York, N. Y.: Wiley, 1969.
- O'Reilly, C. A. & Caldwell, D. Information influence as a determinant of task characteristics and job satisfaction. Journal of Applied Psychology, 1979, 64, 157-165.
- Porras, J. J., & Berg, P. O. Evaluation methodology in organization development: An analysis and critique. Journal of Applied Behavioral Science, 1978, 14, 151-173.
- Roberts, K., & Glick, W. The Job Characteristics Approach to Conceptualization and Research on Task Design: A loosely coupled system. Journal of Applied Psychology, in press.
- Salancik, G. R. & Pfeffer, J. An examination of need satisfaction models of job attitudes. Administrative Science Quarterly, 1977, 22, 427-456.
- Scott, W. E. Activation theory and task design. Organizational Behavior and Human Performance, 1966, 1, 3-30.
- Sims, H., Szilagyi, A., & Keller, R. The Measurement of Job Characteristics. Academy of Management Journal, 1976, 19, 195-212.

- Smith, P. C., Kendall, L. M., & Hulin, C. L. The measurement of satisfaction in work and retirement: A strategy for the study of attitudes. Chicago: Rand McNally, 1969.
- Stone, E. F. & Porter, L. W. Job Characteristics and Job Attitudes: A multivariate study. Journal of Applied Psychology, 1975, 60, 57-64.
- Terborg, J. R., Howard, G. S., & Maxwell, S. E. Evaluating planned organization change: A method for assessing alpha, beta and gamma change. Academy of Management Review, 1980, 5, 109-121.
- Umstot, D. D., Bell, C. H., & Mitchell, T. R. Effects of Job Enrichment and Task Goals on Satisfaction and Productivity Implication for Job Design. Journal of Applied Psychology, 1976, 61, 379-394.
- White, S. E. & Mitchell, T. R. Job enrichment versus social cues: A comparison and competitive test. Journal of Applied Psychology, 1979, 64, 1-9.

FOOTNOTE

This research was supported in part by Grant No. N00014-78-C-0756, from the Office of Naval Research, James R. Terborg principal investigator. We thank George Howard, Scott Maxwell and Robert Keller for contributions made as members of the second author's Master's Thesis committee. Reprints can be obtained from James R. Terborg, Department of Management, College of Business Administration, University of Oregon, Eugene OR 97403.

Table 1
Treatment Conditions¹

Group	Order of Data Collection			Sample Size	Task Order
1	Pre	Post	Then	12	U-E ²
2		Post	Then	8	U-E
3	Pre	Then	(Post)	9	U-E
4	Pre	Post	(Then)	9	U-E
5	Pre	Post	Then	10	U-U

¹The measures enclosed with () were presented only after the subjects had completed all other questionnaires and believed they were finished with the task.

²U = Unenriched task; E = Enriched task.

Table 2
Means, Standard Deviations and Univariate F Tests:
Pre-Test Measures for Groups 1, 3, 4 and 5.

Variable		Group 1	Group 3	Group 4	Group 5	F value ¹
GNS	\bar{X}	6.90	6.99	6.42	7.24	0.56
	S.D.	1.02	2.20	1.32	0.73	
IWM	\bar{X}	3.14	3.41	4.45	3.45	1.79
	S.D.	1.28	1.80	0.78	1.27	
Satisfaction	\bar{X}	3.16	2.83	3.44	2.90	0.25
	S.D.	1.61	1.76	1.68	1.72	
MPS	\bar{X}	20.96	20.61	56.54	30.72	1.09
	S.D.	20.75	33.51	86.81	39.58	
Performance ²	\bar{X}	0.81	1.21	1.14	1.13	0.35
	S.D.	0.67	0.58	0.57	0.55	

¹For all of the univariate tests, $p > .10$.

²Performance measure for unenriched task was operationalized as the average of the absolute values of deviation scores from the actual time spent talking by the interviewer in each of three interviews. Scores represent time in minutes.

Table 3
Means and Standard Deviations for Pre and Post-test Variables and
Univariate F Tests for Change Scores

Variable		Experimental Group		Control Group		F Value
		Pre	Post	Pre	Post	
MPS	\bar{X}	32.70	102.88	30.72	31.96	5.75*
	S.D.	47.04	73.77	39.58	42.64	
IWM	\bar{X}	3.66	4.58	3.45	3.12	5.87*
	S.D.	1.29	1.00	1.27	0.78	
Satisfaction	\bar{X}	3.14	4.81	2.90	2.65	9.88*
	S.D.	1.68	1.05	1.72	1.58	

* $p < .05$.

Table 4

Regression Results for Prediction of General Satisfaction Change Scores¹

<u>Variables in Step 1</u>	<u>R² Change</u>	<u>Variables in Step 2</u>	<u>R² Change</u>	<u>Variables in Step 3</u>	<u>R² Change</u>
Post-Pre MPS	.37*	GNS	.05	MPS x GNS	.01
GNS	.08	Post-Pre MPS	.34*	GNS x MPS	.01
Post-Then MPS	.29*	GNS	.04	MPS x GNS	.02
GNS	.08	Post-Then MPS	.25*	GNS x MPS	.02

¹ R² for the full model using Post-Pre MPS change scores was .42 ($p < .01$) and R² for the full model using Post-Then MPS change scores was .35 ($p < .01$).

* $p < .05$.

Table 5

Regression Results for Prediction of Internal Work Motivation Change Scores (N=40)¹

<u>Variables in Step 1</u>	<u>R² Change</u> *	<u>Variables in Step 2</u>	<u>R² Change</u>	<u>Variables in Step 3</u>	<u>R² Change</u>
Post-Pre MPS	.35	GNS	.02	MPS x GNS	.03
GNS	.03	Post-Pre MPS	.33 [*]	GNS x MPS	.03
Post-Then MPS	.27 [*]	GNS	.01	MPS x GNS	.03
GNS	.03	Post-Then MPS	.24 [*]	GNS x MPS	.03

¹ R² for the full model using Post-Pre MPS change scores was .39 (p < .01) and R² for the full model using Post-Then MPS change scores was .31 (p < .01).

* p < .05.

Table 6
Regression Results for Prediction of Post Test Performance (N=30)

<u>Variables in Step 1</u>	<u>R² Change</u>	<u>Variables in Step 2</u>	<u>R² Change</u>	<u>Variables in Step 3</u>	<u>R² Change</u>
Post-Pre MPS	.03	GNS	.05	MPS x GNS	.00
GNS	.04	Post-Pre MPS	.04	GNS x MPS	.00
Post-Then MPS	.08	GNS	.08	MPS x GNS	.01
GNS	.04	Post-Pre MPS	.12	GNS x MPS	.01

¹ R² for the full model using Post-Pre MPS change scores was .08 **NS** and
R² for the full model using Post-Then MPS change scores was .17 **NS**

DISTRIBUTION LIST

LIST 1
MANDATORY

Defense Documentation Center (12 copies)
ATTN: DDC-TC
Accessions Division
Cameron Station
Alexandria, VA 22314

Library of Congress
Science and Technology Division
Washington, DC 20540

Chief of Naval Research (3 copies)
Office of Naval Research
Code 452
800 N. Quincy Street
Arlington, VA 22217

Commanding Officer (6 copies)
Naval Research Laboratory
Code 2627
Washington, DC 20375

LIST 2
ONR FIELD

Commanding Officer
ONR Branch Office
1030 E. Green Street
Pasadena, CA 91106

Psychologist
ONR Branch Office
1030 E. Green Street
Pasadena, CA 91106

Commanding Officer
ONR Branch Office
536 S. Clark Street
Chicago, IL 60605

Psychologist
ONR Branch Office
536 S. Clark Street
Chicago, IL 60605

Commanding Officer
ONR Branch Office
Bldg. 114, Section D
666 Summer Street
Boston, MA 02210

Psychologist
ONR Branch Office
Bldg. 114, Section D
666 Summer Street
Boston, MA 02210

Office of Naval Research
Director, Technology Programs
Code 200
800 N. Quincy Street
Arlington, VA 22217

LIST 3
OPNAV

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Scientific Advisor to DCNO (Op-01T)
2705 Arlington Annex
Washington, DC 20350

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Director, Human Resource Management
Division (Op-15)
Department of the Navy
Washington, DC 20350

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Head, Research, Development, and
Studies Branch (Op-102)
1812 Arlington Annex
Washington, DC 20350

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Director, Human Resource Management
Plans and Policy Branch (Op-150)
Department of the Navy
Washington, DC 20350

Chief of Naval Operations
Head, Manpower, Personnel, Training
and Reserves Team (Op-964D)
The Pentagon, 4A578
Washington, DC 20350

Chief of Naval Operations
Assistant, Personnel Logistics
Planning (Op-987P10)
The Pentagon, 5D772
Washington, DC 20350

LIST 4
NAVMAT & NPRDC

NAVMAT

Naval Material Command
Program Administrator, Manpower,
Personnel, and Training
Code 08T244
1044 Crystal Plaza #5
Washington, DC 20360

Naval Material Command
Management Training Center
NMAT 09M32
Jefferson Plaza, Bldg #2, Rm 150
1421 Jefferson Davis Highway
Arlington, VA 20360

NPRDC

Commanding Officer (5 copies)
Naval Personnel R&D Center
San Diego, CA 92152

Navy Personnel R&D Center
Washington Liaison Office
Building 200, 2N
Washington Navy Yard
Washington, DC 20374

LIST 5
BUMED

Commanding Officer
Naval Health Research Center
San Diego, CA

Commanding Officer
Naval Submarine Medical
Research Laboratory
Naval Submarine Base
New London, Box 900
Groton, CT 06340

Director, Medical Service Corps
Bureau of Medicine and Surgery
Code 23
Department of the Navy
Washington, DC 20372

Naval Aerospace Medical
Research Lab
Naval Air Station
Pensacola, FL 32508

CDR Robert Kennedy
Officer in Charge
Naval Aerospace Medical
Research Laboratory Detachment
Box 2940, Michoud Station
New Orleans, LA 70129

National Naval Medical Center
Psychology Department
Bethesda, MD 20014

Commanding Officer
Navy Medical R&D Command
Bethesda, MD 20014

LIST 6
NAVAL POSTGRADUATE SCHOOL

Naval Postgraduate School
ATTN: Dr. Richard S. Elster
Department of Administrative Sciences
Monterey, CA 93940

Naval Postgraduate School
ATTN: Professor John Senger
Operations Research and
Administrative Science
Monterey, CA 93940

Superintendent
Naval Postgraduate School
Code 1424
Monterey, CA 93940

LIST 7
HRM

Officer in Charge
Human Resource Management Detachment
Naval Air Station
Alameda, CA 94591

Officer in Charge
Human Resource Management Detachment
Naval Submarine Base New London
P.O. Box 81
Groton, CT 06340

Officer in Charge
Human Resource Management Division
Naval Air Station
Mayport, FL 32228

Commanding Officer
Human Resource Management Center
Pearl Harbor, HI 96860

Commander in Chief
Human Resource Management Division
U.S. Pacific Fleet
Pearl Harbor, HI 96860

Officer in Charge
Human Resource Management Detachment
Naval Base
Charleston, SC 29408

Commanding Officer
Human Resource Management School
Naval Air Station Memphis
Millington, TN 38054

Human Resource Management School
Naval Air Station Memphis (96)
Millington, TN 38054

Commanding Officer
Human Resource Management Center
1300 Wilson Boulevard
Arlington, VA 22209

Commanding Officer
Human Resource Management Center
5621-23 Tidewater Drive
Norfolk, VA 23511

Commander in Chief
Human Resource Management Division
U.S. Atlantic Fleet
Norfolk, VA 23511

Officer in Charge
Human Resource Management Detachment
Naval Air Station Ehdibey Island
Oak Harbor, WA 98278

Commanding Officer
Human Resource Management Center
Box 23
FPO New York 09510

Commander in Chief
Human Resource Management Division
U.S. Naval Force Europe
FPO New York 09510

Officer in Charge
Human Resource Management Detachment
Box 60
FPO San Francisco 96651

Officer in Charge
Human Resource Management Detachment
COMNAVFORJAPAN
FPO Seattle 98762

LIST 8
NAVY MISCELLANEOUS

Naval Amphibious School
Director, Human Resource
Training Department
Naval Amphibious Base
Little Creek
Norfolk, VA 23521

Chief of Naval Education
and Training (N-5)
ACOS Research and Program
Development
Naval Air Station
Pensacola, FL 32508

Naval Military Personnel Command (2 copies)
HRM Department (NMPC-6)
Washington, DC 20350

Navy Recruiting Command
Head, Research and Analysis Branch
Code 434, Room 8001
801 North Randolph Street
Arlington, VA 22203

Chief of Naval Technical Training
ATTN: Dr. Norman Kerr, Code 0161
NAS Memphis (75)
Millington, TN 38054

Naval Training Analysis
and Evaluation Group
Orlando, FL 32813

Commanding Officer
Naval Training Equipment Center
Orlando, FL 32813

Naval War College
Management Department
Newport, RI 02940

LIST 9
USMC

Commandant of the Marine Corps
Headquarters, U.S. Marine Corps
Code MPI-20
Washington, DC 20380

Headquarters, U.S. Marine Corps
ATTN: Dr. A. L. Slafkosky,
Code RD-1
Washington, DC 20380

LIST 11
OTHER FEDERAL GOVERNMENT

National Institute of Education
Educational Equity Grants Program
1200 19th Street, N.W.
Washington, DC 20208

National Institute of Education
ATTN: Dr. Fritz Muhlhauser
EOLC/SMO
1200 19th Street, N.W.
Washington, DC 20208

National Institute of Mental Health
Minority Group Mental Health Programs
Room 7 - 102
5600 Fishers Lane
Rockville, MD 20852

Office of Personnel Management
Organizational Psychology Branch
1900 E Street, NW.
Washington, DC 20415

Chief, Psychological Research Branch
ATTN: Mr. Richard Lanterman
U.S. Coast Guard (G-P-1/2/62)
Washington, DC 20590

Social and Developmental Psychology
Program
National Science Foundation
Washington, DC 20550

LIST 12
ARMY

Army Research Institute
Field Unit - Monterey
P.O. Box 5787
Monterey, CA 93940

Deputy Chief of Staff for
Personnel, Research Office
ATTN: DAPE-PBR
Washington, DC 20310

Headquarters, FORSCOM
ATTN: AFPR-HR
Ft. McPherson, GA 30330

Army Research Institute
Field Unit - Leavenworth
P.O. Box 3122
Fort Leavenworth, KS 66027

Technical Director (2 copies)
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

LIST 13
AIR FORCE

Air University Library/LSE 76-443
Maxwell AFB, AL 36112

AFOSR/NL (Dr. Fregly)
Building 410
Bolling AFB
Washington, DC 20332

Air Force Institute of Technology
AFIT/LSGR (Lt. Col. Umstot)
Wright-Patterson AFB
Dayton, OH 45433

Technical Director
AFHRL/ORS
Brooks AFB
San Antonio, TX 78235

AFMPC/DPMYP
(Research and Measurement Division)
Randolph AFB
Universal City, TX 78148

LIST 15
CURRENT CONTRACTORS

Dr. Clayton P. Alderfer
School of Organization
and Management
Yale University
New Haven, CT 06520

Dr. H. Russell Bernard
Department of Sociology
and Anthropology
West Virginia University
Morgantown, WV 26506

Dr. Arthur Blaiwes
Human Factors Laboratory, Code N-71
Naval Training Equipment Center
Orlando, FL 32813

Dr. Michael Borus
Ohio State University
Columbus, OH 43210

Dr. Joseph V. Brady
The Johns Hopkins University
School of Medicine
Division of Behavioral Biology
Baltimore, MD 21205

Mr. Frank Clark
ADTECH/Advanced Technology, Inc.
7923 Jones Branch Drive, Suite 500
McLean, VA 22102

Dr. Stuart W. Cook
University of Colorado
Institute of Behavioral Science
Boulder, CO 80309

Mr. Gerald M. Croan
Westinghouse National Issues
Center
Suite 1111
2341 Jefferson Davis Highway
Arlington, VA 22202

Dr. Larry Cummings
University of Wisconsin-Madison
Graduate School of Business
Center for the Study of
Organizational Performance
1155 Observatory Drive
Madison, WI 53706

Dr. Asa G. Hilliard, Jr.
The Urban Institute for
Human Services, Inc.
P.O. Box 15068
San Francisco, CA 94115

Dr. Charles L. Hulin
Department of Psychology
University of Illinois
Champaign, IL 61820

Dr. Edna J. Hunter
United States International
University
School of Human Behavior
P.O. Box 26110
San Diego, CA 92126

Dr. Rudi Klauss
Syracuse University
Public Administration Department
Maxwell School
Syracuse, NY 13210

Dr. Judi Komaki
Georgia Institute of Technology
Engineering Experiment Station
Atlanta, GA 30332

Dr. Edward E. Lawler
Battelle Human Affairs
Research Centers
P.O. Box 5395
4000 N.E., 41st Street
Seattle, WA 98105

Dr. Edwin A. Locke
University of Maryland
College of Business and Management
and Department of Psychology
College Park, MD 20742

Dr. Ben Morgan
Performance Assessment
Laboratory
Old Dominion University
Norfolk, VA 23508

Dr. Richard T. Mowday
Graduate School of Management
and Business
University of Oregon
Eugene, OR 97403

LIST 15 (Continued)

Dr. George E. Rowland
Temple University, The Merit Center
Ritter Annex, 9th Floor
College of Education
Philadelphia, PA 19122

Dr. Irwin G. Sarason
University of Washington
Department of Psychology
Seattle, WA 98195

Dr. Benjamin Schneider
Michigan State University
East Lansing, MI 48824

Dr. Saul B. Sells
Texas Christian University
Institute of Behavioral Research
Drawer C
Fort Worth, TX 76129

Dr. H. Wallace Sinaiko
Program Director, Manpower Research
and Advisory Services
Smithsonian Institution
801 N. Pitt Street, Suite 120
Alexandria, VA 22314

Dr. Richard Steers
Graduate School of Management
and Business
University of Oregon
Eugene, OR 97403

Dr. Arthur Stone
State University of New York
at Stony Brook
Department of Psychology
Stony Brook, NY 11794

Dr. James R. Terborg
University of Houston
Department of Psychology
Houston, TX 77004

Mrs. P. Thorndyke and M. Weiner
The Rand Corporation
1700 Main Street
Santa Monica, CA 90406

Dr. Howard M. Weiss
Purdue University
Department of Psychological
Sciences
West Lafayette, IN 47907

Dr. John P. French, Jr.
University of Michigan
Institute for Social Research
P.O. Box 1248
Ann Arbor, MI 48106

Dr. Paul S. Goodman
Graduate School of Industrial
Administration
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. J. Richard Hackman
School of Organization
and Management
Yale University
56 Hillhouse Avenue
New Haven, CT 06520

Dr. Joseph Olmstead
Human Resources Research
Organization
300 North Washington Street
Alexandria, VA 22314

Dr. Thomas M. Ostrom
The Ohio State University
Department of Psychology
116E Stadium
404C West 17th Avenue
Columbus, OH 43210

Dr. Philip G. Zimbardo
Stanford University
Department of Psychology
Stanford, CA 94305

DAT
ILMI